ARCHITECT/ENGINEER'S

ROOF DESIGN MANUAL

MISSOURI DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION
(573) 526-6671

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DESIGN GUIDELINES

07311 Shingles **07410 Manufactured Roof Panels (Metal)**
07550 Modified Bituminous Roofing **07531 Single Ply Roofing**

A. **GENERAL INFORMATION:** The following information is intended to help avoid common roof problems and to help determine which type of roof to select in a new construction or re-roofing project. This information is based on previous Division experience, and current trends in the roofing industry.

1. No asbestos containing materials shall be allowed. Specifically caution about use of asbestos mastics and primers that are still available today.

2. All design details shall be consistent with the *2004 NRCA Roofing and Waterproofing Manu*al. Minimize penetrations in roofs, space penetrations no closer than 24 inches apart, extend flashings a minimum of 12 inches above any overflow or drain, use factory made penetrations if possible, do not use galvanized material for flashings. Use a termination bar and counter-flashing at parapet walls, or if the parapet is short or not watertight, extend membrane over the top of the wall and attach to front face behind cap. Corner caps and allowance for expansion and contraction in metal flashings is required. Umbrellas or hoods over all pipe flashings for equipment and over pitch pockets are required. Conduit and small pipe penetrations must be made through the side of metal flashings with proper sealants or with specifically designed conduit flashings.

3. Provide walkways to all rooftop equipment. Avoid interior gutter installations. Use two-piece, cast iron, interior drains. Use pipe or tubes for equipment stands. Place **all** equipment a minimum of 24 inches above roof deck for future re-roofing.

4. For Single-Ply systems or Modified Bitumen roofs, interior roof drains and parapet walls with scuppers, are preferable. Avoid the use of gravel guards. If structural system is flat, locate drains at mid points between columns.

5. Primary slope for new roofs should be obtained through the structural system. **Minimum slope for all roofs is ¼' in 12" per IBC Code, 1507.11.1 for modified systems and 1507.12.1 for Thermoset roofs. This is a Design and Construction mandatory requirement. Specific approval must be obtained for anything less than ¼" in 12". Slope crickets at ½" in 12" minimum to maintain drainage. Taper insulation at edge flashings to avoid buildup which ponds water. Provide sumps (2' x 2') at all primary drains.**

6. Insulation system shall be compatible with the application and warranty specified. Roofing manufacturer must approve the insulation system required for roofing warranty.

7. Comply with ASHRAE 90.1 energy requirements with no less than an average U Value of .05 for the composite roofing system. A vapor barrier below the primary insulation is required over shower houses, swimming pools, boiler rooms, or any other area subject to high humidity conditions. A worksheet to locate critical temperatures should be utilized for vapor barrier review.

8. A full Labor and Material **System** Warranty (weathertightness) signed by both the installer and the manufacturer is required (see required language below).

9. Roof details must provide minimum flashing heights required for curbs, walls, parapets, etc. Determine if non-tapered insulation will require raising units, parapets, etc. Sheet metal, flashings, roof composite construction, parapets, terminations, expansion joints, and penetrations shall be designed according to the *2004 NRCA Roofing and Waterproofing Manu*al details and specifications unless approved by Director.

10. **All new and re-roof projects shall be designed for UL 90 or FM 1-90 ratings and specifications shall specify a minimum wind speed warranty of 72 MPH.**

11. No roofing or re-roofing project is to begin from November 1 through March 1, without specific approval from Manager, Project Management Unit. **Include this language in Supplementary General Conditions and allow time in schedule if necessary.**

12. Designer shall complete **"Roofing Description Form**" and submit with Final design documents. Specifications shall require roof contractor to provide a 12 inch by 12 inch sample of roof membrane (single-ply or modified-bitumen) from actual material used in project, along with a copy of the manufacturer's roof warranty to D&C Construction Administrator for forwarding to roof group.

B. **PRODUCTS - NEW CONSTRUCTION:** The type of roof to be used in new construction varies greatly with the type of construction and the intended use. The following are some examples of types and uses.

1. Shingle Roof: Used primarily on wood frame construction, requires plywood and felt back-up.

   a. Shingles should be 30 year, Class A Fire Resistance, asphalt type. Shingles should be seal-tab architectural type. Roof slopes of 4:12 or greater are required.

2. Metal Systems: All metal roofing systems shall carry a minimum of a 20 year **System** warranty. **This warranty shall include all flashings**, **curbs, pipe flashings, and penetrations**. All metal roofs must have a UL Class 90 or Factory Mutual 1-90 wind uplift rating. Metal roofs will be Structural Standing Seam or Architectural systems. **Machine seaming with a factory sealant in sidelaps is required of all Structural and Architectural roofs. No on-site panel fabrication is allowed.**

   a. Structural standing seam roofs are preferred. A variation of the structural standing seam panels can be found in the composite roofs that consist of an inside metal deck, a vapor barrier, rigid thermal insulation and the standing seam roof material. Standing Seam roofs shall be a double-lock, roll-formed seam at least 2 1/2" high. Minimum thickness shall be 24 gauge. Minimum slope should be 1/2 inch in 12 inches. All clips shall be concealed, and allow for expansion and contraction. All accessories shall be pre-manufactured and approved as part of roofing system. Curbs for roof penetrations shall be designed and built using manufacturer's approved details for the roofing system. Standard finish for low-profile applications shall be ALZN or galvalume. Painted finishes for high profile roofs shall have 20 year paint finish warranty.

   b. Flat, structural standing seam metal roofing systems may be used on roofs with slopes of 2 inches in 12 inches or greater only. Some of these systems need some type of deck for support, or will work over an existing deck, as well as a base felt for additional moisture protection. Many of these systems are attached with fixed cleats that do not allow for expansion or contraction. Limit panel lengths to 40 feet or less. Require the panel to be machine seamed with side lap sealant. The roof system must be attached to the substrate and vapor barrier approved by the manufacturer. Avoid vented ridge conditions if at all possible. The Division has had serious problems with vented ridge caps. Use fans and soffit vents if necessary. If the roof is to be installed with a vented air space, it must be demonstrated that the allowable roof systems (minimum of three) have a tested vented system.

   3. Modified Bitumen: Modified Bitumen roofs should be installed with a minimum of 1/4 inch in 12 inch slope.

   a. Modified Bitumen roofs shall be **designed** for a 20 year roof warranty. In most applications, we shall only request a 15 year warranty in the bidding documents. All MBS systems shall be specified to have a modified base sheet or a venting, modified base sheet; a minimum of two plies; plus a granular cap sheet. SBS Modified Bitumen systems should be used.

   b. A sample modified bitumin specification is included with this manual. Edit and use this specification unless specific approval is given to vary from the enclosed specification.

4. Built-up Roof: Built-up roofing is not an approved roof system. The use of a built-up roof system shall be approved by the Director.

5. Single-Ply Membrane Systems: The only two State accepted single-ply systems are the EPDM, 60 mil, fully adhered roof, or a 60 mil, TPO, fully adhered roof. Single-Ply roofs should be installed with a minimum of 1/4 inch in 12 inch slope. . Use of any other system requires the approval of the Director.

a. Fully-adhered membranes should be a minimum of 60 mil material. A minimum 15 year warranty is required for EPDM and TPO roofs**. Splice tapes are required at all laps of EPDM membrane**. Mechanically attached or ballasted systems are not to be used.

b. Use a wood fiber cover board over polyisocyanurate insulation with fully adhered system. Mechanically fastened insulation is preferred.

6. Other Systems: Other roof systems such as slate, roofing tile, etc. may be used in special circumstances as approved by the Division and the Agency.

C. **RE-ROOF APPLICATIONS**: All of the above roof systems may have an application for re-roofing. The following items should be considered in any re-roofing application:

1. Do not re-roof a flat roof with another flat roof. Use tapered, polyisocyanurate insulation, metal slope build-up, or other appropriate system to obtain minimum slopes for new construction. **Add additional roof drains or scuppers if necessary to avoid insulation thicknesses over 12 inches, if possible.** Remove any unused or unneeded roof structure or penetrations.

2. Unless otherwise approved by the Division, do not re-roof over an existing roof. Re-roofing over an existing roof could cause serious problems with trapped moisture in the existing roof. It could also be a violation of Code. **A complete tear-off is required**.

3. Replace deteriorated flashings, counterflashings, gutters, downspouts, etc. with material warranted for the same duration or greater as the roof warranty.

4. Add insulation to roof system per ASHRAE 90.1 but no less than a U Value of .05. Provide calculations with design submittal or review documents.

5. Consider the addition of a roof hatch and ladder for access to roof if none exists.

6. Drains, curbs, and equipment shall be raised or lowered to proper levels. Steep slopes to drains are not allowed.

D. WARRANTIES: The state of Missouri is prohibited from entering into binding arbitration. No warranty shall be accepted with any arbitration clause.

1. **Low Profile Modified Bitumen, TPO and EPDM Roofs: The** following language is required for all low profile roof warranties.

a. The roofing manufacturer shall provide written confirmation, submitted with shop drawings, that: "All roofing components exclusive of the deck, contained in the system proposed are approved, and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of project if system is installed as designed.

b. A fifteen year SYSTEM warranty shall be provided for EPDM, TPO or Modified Bitumin roofs. This warranty shall be for full replacement cost and shall be non-prorated. In addition, all insulation, flashings and penetrations shall be included within this warranty.

c. Warranty shall be executed by both the system manufacturer and the roofing contractor.

d. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering roofing insulation, fasteners, vapor retarders, membrane roofing, base flashing, penetrations, curbs, accessories, etc, if any, for the following warranty period: **5 years from date of Substantial Completion. (See attached format)**

e. **Special Warranty Language**: The liability of the Surety under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the Substantial Completion date of the project. Any warranty beyond this two years is an agreement between the Owner and the Contractor and falls outside the performance bond obligation.

2. **Metal Structural and Architectural Systems**: All metal roofing systems shall carry a minimum of a 20 year **system** warranty such as Butler's "Weathertight Gold" system warranty. Warranty shall cover all roof curbs, pipejacks, roof transitions and any other roof penetrations.

   Painted panels and their finishes shall carry a 20 year material, Extended-Life Endorsement if it is not a part of the SYSTEM warranty. Warranty shall be executed by both the system manufacturer and the roofing contractor. Specifications shall require roofing contractor to guarantee complete installation and any area of work not covered by roof system warranty for **5 years.**

   Also specify that: **Roofing installer must be a certified installer by the roof manufacturer, with the certified installer on the job while the roof is being installed. Roof installer must have 5 years minimum experience installing metal roofs.**

ROOFING INSTALLER'S WARRANTY

A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

   1. Owner:
   2. Address:
   3. Building Name/Type:
   4. Address:
   5. Area of Work:
   6. Acceptance Date:
   7. Warranty Period:
   8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

   1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

      a. lightning,
      b. peak gust wind speed exceeding 72 mph,
      c. fire,
      d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition,
      e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work,
      f. vapor condensation on bottom of roofing and
      g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

   2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.

   3. The Roofing Installer is responsible for damage to work covered by this Warranty

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

6. This Warranty is recognized to be the installation warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents and to coordinate the Manufacturer's warranty, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

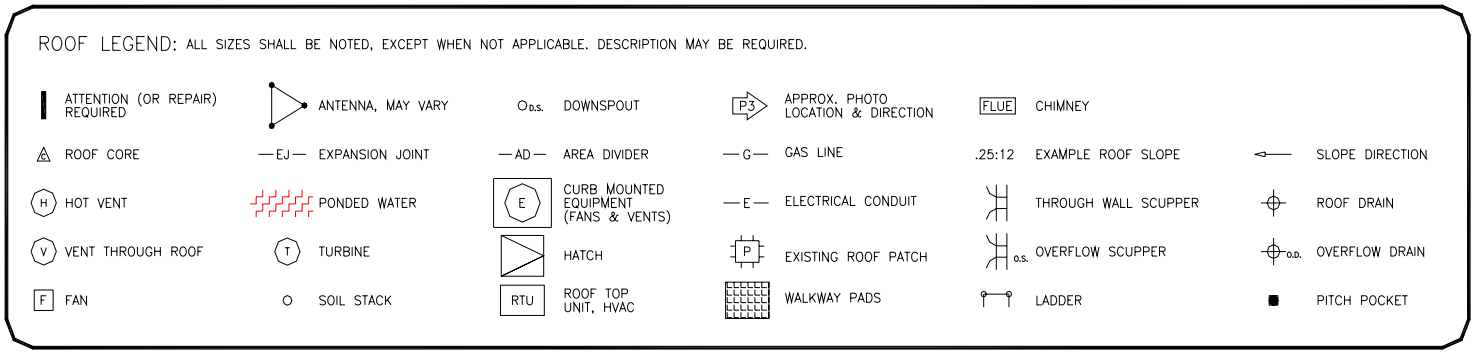
E. IN WITNESS THEREOF, this instrument has been duly executed this<DAY>day of <MONTH>, 19<YEAR>.

1. Authorized Signature:
2. Name:
3. Title:

END OF SECTION-07552

07311
07410
07526
07530

ROOF SYMBOLS



ADDITIONAL PROJECT REQUIREMENTS

In addition to the Design Guidelines, the following is a list of items that must be included in any roof project.

1. A/E shall as a minimum, indicate on roof plans the following:

   - Basic roof lay-out showing all roof top units, drains, accessories, and penetrations.
   - All roof edge conditions.
   - All applicable flashing conditions, including new curb details as necessary.
   - All adjoining walls or stepped roof areas.
   - Expansion joints and vapor barriers.
   - Insulation lay-out including thickness, crickets if applicable, and slope.
   - Height of new roof surface at every roof-top curb or penetration and details to raise accessory if necessary.

2. A/E shall list in the acceptable products division of the specifications each manufacturer's specific system that is an acceptable alternate system to the one proposed.

3. The *Substitution Request* form shall be included in project manual and any substitution of a roof system other than those specified must be approved at least 10 days in advance of bid date. A copy of this form is enclosed.

4. Specify that Night-Seals or Cut-Offs used shall flash all of roof system down to the deck to prevent water penetration into the new roof.

5. Project A/E shall use the standard roof symbols on all drawings and details as enclosed in this manual and as listed 2004 *NRCA Roofing and Waterproofing Manual.*

PROJECT MANAGER/DESIGNER CHECKLIST

For

ROOF PROJECTS

1.	Have Design Standards been reviewed and incorporated in design?	____ yes ____ no
2.	Are design details consistent with, or designed from 2004 *NRCA Roofing and Waterproofing Manual*?	____ yes ____ no
3.	Has the facility been visited and roof dimensions and accessories adequately verified?	____ yes ____ no
4.	Has a vapor barrier calculation been completed?	____ yes ____ no
5.	Is the roof warranty a full "system" warranty including the roof manufacturer and contractor?	____ yes ____ no
6.	Has a roof core been taken to determine composition of existing roof insulation and deck? Has roof been checked for asbestos?	____ yes ____ no
7.	What is minimum slope designed into project?	_____ in/ft.
8.	Is the new roof and insulation system in compliance with ASHRAE 90.1?	____ yes ____ no
9.	What is the average "U Value" for new roof?	_____

SUPPLEMENTARY OR SPECIAL CONDITIONS

1. In addition to the Pre-Construction Conference required by the State of Missouri's, General Conditions; a **Pre-Installation** Conference shall be held no earlier than two weeks before the start of the roof work. This Conference shall not be scheduled until all submittals have been received and approved by the project A/E.

2. The submittals shall include as a minimum the following:

   - A complete schedule of all proposed work with a phasing plan indicating sequence of removal and replacement of roof. Show phasing on a roof plan defining each day's proposed work.

   - Manufacturer's approved, but project specific, installation details of roofing and flashings, including roof slopes and insulation lay-outs, penetration details, curbs, and accessories.

   - A "systems" letter from the manufacturer agreeing "That all roofing components exclusive of the deck, contained in the system proposed are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of project if system is installed as designed.

   - Submit sample of proposed manufacturer's roof warranty.

   - A detail showing proposed Night Seal or Cut-Off flashing to be used at end of each day's work.

3. Roofing Contractor shall notify Construction Administrator when Manufacturer's final Warranty inspection is to occur. Furnish a copy of the warranty inspection report to Construction Administrator.

4. The Contractor must provide copies of all disposal receipts for any hazardous materials removed from roof.

5. The Contractor shall not remove any more roofs during the day than they can completely replace with new roofing materials including night seal-off and flashing of perimeter and accessories.

SECTION 07311 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Asphalt shingles.
2. Felt underlayment.
3. Self-adhering sheet underlayment.
4. Ridge vents.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for roof deck wood structural panels.
2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings and counterflashings not part of this Section.
3. Division 7 Section "Roof Accessories" for ridge vents.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Manufacturer’s Literature for Initial Selection: For each type of asphalt shingle, ridge and hip cap shingle, ridge vent and exposed valley lining indicated.

1. Include similar literature of trim and accessories involving color selection.

C. Qualification Data: For Installer**,** including certificate signed by asphalt shingle manufacturer stating that Installer is approved, authorized, or licensed to install roofing system indicated.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.

E. Research/Evaluation Reports: For asphalt shingles.

F. Maintenance Data: For asphalt shingles to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1. Installer must have a minimum of three (3) years experience installing the roof system specified.
2. Job Site Superintendent must have a minimum of 5 years experience in roofing.

B. Source Limitations: Obtain ridge and hip cap shingles, ridge vents felt underlayment and self-adhering sheet underlayment through one source from a single asphalt shingle manufacturer.

C. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

D. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner, roofing Installer, roofing, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.

1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.

1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials within specified warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time.

1. Material Warranty Period: 30 years from date of Substantial Completion, nonprorated.
2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 70 mph (33 m/s) for 10 years from date of Substantial Completion.
3. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
4. Workmanship Warranty Period: 5 years from date of Substantial Completion.

B. Installers Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system for the following warranty period:

1. The liability of the Surety Company under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the substantial completion date of the project. Any warranty beyond the first two years is an agreement between the owner and the contractor and falls outside the performance bond obligation.

2. Warranty Period: Five (5) years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 100 sq. ft (9.3 sq. m) of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Products:

a. Atlas Roofing Corporation; Pinnacle (35).
b. CertainTeed Corporation; Landmark 30
c. GAF Materials Corporation; Timberline 30
d. Owens Corning; Oakridge Pro 30
e. TAMKO Roofing Products, Inc.; Heritage 30

2. Butt Edge: Straight cut.
3. Strip Size: Manufacturer's standard.
4. Algae Resistance: Granules treated to resist algae discoloration.
5. Color and Blends: As selected by Architect from manufacturer's full range.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.3 UNDERLAYMENT MATERIALS

A. Felts: No. 30 roofing felt, ASTM D 226 or ASTM D 4869, Type II, asphalt-saturated organic felts, nonperforated.

B. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil-(1.4-mm-) thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied.

1. Products:

a. Atlas Roofing Corporation; StormMaster DG.
b. CertainTeed Corporation; WinterGuard.
c. GAF Materials Corporation; Weather Watch.
d. Henry Company; Eaveguard.
e. Owens Corning; WeatherLock G.

2.4 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard rigid section high-density polypropylene or other UV-stabilized plastic ridge vent; for use under ridge shingles.

1. Products:

a. Air Vent Inc., a CertainTeed Company; ShingleVent II.
b. Cor-A-Vent, Inc.; V-Series.
c. GAF Materials Corporation; Cobra Rigid Vent II.
d. Lomanco, Inc.; OR-4.
e. Owens Corning; VentSure Ridge Vent.

2.5 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, shank, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.

2.6 METAL FLASHING AND TRIM

A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

1. Sheet Metal: Coil-coated G90 (galvanized) steel.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.

1. Apron Flashings: Fabricate with lower flange a minimum of 5 inches (125 mm) over and 4 inches (100 mm) beyond each side of downslope asphalt shingles and 6 inches (150 mm) up the vertical surface.
2. Step Flashings: Fabricate with a headlap of 2 inches (50 mm) and a minimum extension of 4 inches (100 mm) over the underlying asphalt shingle and up the vertical surface.
3. Cricket or Backer Flashings: Fabricate with concealed flange extending a minimum 24 inches (600 mm) beneath upslope asphalt shingles and[6 inches (150 mm)] beyond each side of chimney or skylight and 6 inches (150 mm) above the roof plane.
4. Open Valley Flashings: Fabricate in lengths not exceeding 10 feet (3 m) with 1-inch- (25-mm-) high inverted-V profile at center of valley and equal flange widths of 12 inches (300 mm).
5. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m) with 2-inch (50-mm) roof deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.

C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches (100 mm) from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Single-Layer Felt Underlayment: Install single layer of felt underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with roofing nails.

1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water. Lap ends of felt not less than 6 inches (150 mm) over self-adhering sheet underlayment.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Roll laps with roller. Cover underlayment within seven days.

1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
2. Eaves: Extend from edges of eaves 36 inches (914 mm) beyond interior face of exterior wall.
3. Rakes: Extend from edges of rake 36 inches (914 mm) beyond interior face of exterior wall.
4. Valleys: Extend from lowest to highest point 18 inches (450 mm).
5. Hips: Extend 18 inches (450 mm) on each side.
6. Ridges: Extend 36 inches (914 mm) on each side without obstructing continuous ridge vent slot.
7. Sidewalls: Extend beyond sidewall 18 inches (450 mm) and return vertically against sidewall not less than 4 inches (100 mm).
8. Dormers, Chimneys, Skylights, and other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches (450 mm) and return vertically against penetrating element not less than 4 inches (100 mm).
9. Roof Slope Transitions: Extend 18 inches (450 mm) on each roof slope.

C. Metal-Flashed Open Valley Underlayment: Install two layers of 36-inch- (914-mm-) wide felt underlayment centered in valley. Stagger end laps between layers at least 72 inches (1830 mm). Lap ends of each layer at least 12 inches (300 mm) in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with roofing nails.

1. Lap roof deck felt underlayment over first layer of valley felt underlayment at least 6 inches (150 mm).

3.3 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.

C. Step Flashings: Install with a headlap of 2 inches (50 mm) and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.

D. Cricket or Backer Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.

E. Open Valley Flashings: Install centrally in valleys, lapping ends at least 8 inches (200 mm) in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.

1. Secure hemmed flange edges into metal cleats spaced 12 inches (300 mm) apart and fastened to roof deck.

F. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.

G. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.

H. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches (175 mm) wide with self-sealing strip face up at roof edge.

1. Do not extend asphalt shingles over fascia at eaves and rakes, unless prescribed by manfacturer’s application guide.
2. Install starter strip along rake edge.

C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

E. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full length first course followed by cut second course, repeating alternating pattern in succeeding courses.

F. Fasten asphalt shingle strips with a minimum of four roofing nails located according to manufacturer's written instructions.

1. Where roof slope exceeds 12:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails located according to manufacturer’s written instructions.
2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
3. Do not install shingles when ambient temperatures are below manufacturer’s recommended application temperature.

G. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley from highest to lowest point.

1. Do not nail asphalt shingles to metal open valley flashings.

H. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

I. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner.**>
2. Address: <**Insert address.**>
3. Building Name/Type: <**Insert information.**>
4. Address: <**Insert address.**>
5. Area of Work: <**Insert information.**>
6. Acceptance Date: <**Insert date.**>
7. Warranty Period: <**Insert time.**>
8. Expiration Date: <**Insert date.**>

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 70 mph (m/sec);
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature.**>
2. Name: <**Insert name.**>
3. Title: <**Insert title.**>

END OF SECTION 07311

SECTION 07411 - STRUCTURAL, TRAPEZOIDAL, STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Trapezoidal, Standing-seam roof panels.

B. Related Sections include the following:

1. Division 5 Section "Cold-Formed Metal Framing" for metal framing.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide manufactured roof panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

B. Water Penetration: Provide manufactured roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward acting, wind-load design pressure of not less than 6.24 lb/sq. ft. (300 Pa) and not more than 12.0 lb/sq. ft. (575 Pa).

C. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for Class 90 wind-uplift resistance.

D. Structural Performance: Provide manufactured roof panel assemblies capable of safely supporting design loads indicated under in-service conditions with vertical deflection no greater than the following, based on testing manufacturer's standard units according to ASTM E 1592 by a qualified independent testing and inspecting agency.
1. Maximum Deflection: 1/180 of the span.

E. Loading Requirements: Provide all panels, supports, trims, and accessories to meet the following: BOCA Building Code, 1996 Edition

1. Roof Snow Load: 20 lbs. No tributory load reductions allowed.
2. Wind Load: 70 MPH - Exposure Factor B - Importance Factor 1
3. Seismic Zone 1 - Importance Factor B
4. Collateral Load: 0 lbs.

1.5 SUBMITTALS

A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

B. Shop Drawings: Show layouts of panels on roof, details of edge conditions, joints, panel profiles, supports, anchorages, trim, flashings, underlayment, closures, snow guards, and special details. Distinguish between factory- and field-assembled work.

C. For installed products indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Samples for Initial Selection: Manufacturer's color charts or chips showing the full range of colors, textures, and patterns available for roof panels with factory-applied finishes.

E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Product Test Reports: Indicate compliance of manufactured roof panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Missouri and who is experienced in providing engineering services of the kind indicated.

C. Fire-Test-Response Characteristics: Where fire-resistance-rated roof panel assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against damage during transportation or handling.

B. Handling: Exercise care in unloading, storing, and erecting roof panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with their materials that might cause staining, denting, or other surface damage. Slope panels to drain.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal roof panels within the specified warranty period and agreeing to repair finish or replace roof panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

C. Finish Warranty Period: 20 years from date of Substantial Completion.

D. Special Weathertight System Warranty: **Submit a written warranty, signed by roofing system manufacturer agreeing to promptly repair leaks in the complete system including roof membrane and flashings, penetrations, curbs, accessories, etc., resulting from defects in materials or workmanship for the warranty period listed below. The manufacturer's liability shall not exceed the original installed cost of the roofing system. Indicate by letter that "All roofing components contained in the system proposed are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of the project if system is installed as designed.**

1. Warranty Period: 20 years.

   The State of Missouri is prohibited by law from entering into binding arbitration. No warranty shall be submitted with any arbitration clause.

2. Warranty Period: 20 years.

E. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering roofing, insulation, fasteners, flashings, penetrations, curbs, accessories, etc, if any, for the following warranty period:

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal roof systems that are considered acceptable and may be incorporated into the Work include, but are not limited to, the following:

1. American Buildings Roofing and Architectural Products.- Standing Seam 360 System
2. Butler Manufacturing Co. - MR-24 Roof System
3. Metal Building Components, Inc. - Double-Lok 124 System

4. Star Manufacturing Company - Starshield Roof System
5. Steelox - XTR (Sentry) Panel
6. Varco/Pruden. - SSR Roof System
7. Centria - System SDP-300

B. Substitutions: Any proposed substitution to the list above must be approved a minimum of 10 days in advance of bid date by submitting the "SUBSTITUTION REQUEST" form enclosed with bidding documents.
The product specifications listed in SECTIONS 2.2, and 2.3 are performance specifications indicating the minimum level of quality required to be considered as an "Acceptable Substitution."

2.2 PANEL FINISH

A. 24 gage Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by he hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755 . Color to be selected from manufacturer's full range of colors.

B. Pre-Painting to be Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil (0.023 mm) and 30 percent reflective gloss when tested according to ASTM D 523.

C. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of 5 Hunter units.

OR

D. 24 GAGE, Aluminum-Zinc Alloy-Coated Steel Sheet: (Galvalume or ALZN) ASTM A 792, Class AZ-50 coating, Grade 40 (ASTM A 792M, Class AZ-150 coating, Grade 275); structural quality.

2.3 PANEL CONSTRUCTION

A. Trapezoidal, Standing-Seam Roof Panels: Panels shall be 24 inch wide, factory-formed, standing-seam roof panel assembly designed for concealed mechanical attachment of panels to roof purlins or deck.. Panels shall be field seamed by machine creating a 360 degree Pittsburgh, double lock standing seam Panel seam must contain factory applied sealant. Panel seam must be a minimum of 2 1/2 inches above flat of panel.

B. Panel clips must be designed to allow for a minimum of one inch thermal expansion in each direction from nominal centered clip, two inches total expansion and contraction.

C. Purlin insulation blocks shall be installed along all roof structural members.

2.4 THERMAL INSULATION

A. Metal Building Insulation: NAIMA 202-96, glass-fiber-blanket insulation, thickness as indicated, with a flame-spread rating of 25 or less, and 3-inch- (50-mm-) wide, continuous, vapor-tight edge tabs.

1. Facing: CL 5010 OR WMP-10 Metallized, Polypropylene/scrim/kraft .

a. 1. Perm rating shall be .02 perm

B. Support system: Insulation shall be installed using Central Glass Insulation, "INSUL BASKET" system or Thermal Design's, "Simple Saver System."

OR

C. Support system: Insulation shall be installed using Central Glass Insulation, "PERFECT R" system or Owens Corning, "Elaminator 300 Series"

2.5 ROOF ACCESSORIES

A. General: Provide materials and accessories required for a complete roof assembly and as recommended by manufacturer, unless otherwise indicated.

B. Accessories: Unless otherwise specified, provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

C. Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Snow Guards: Prefabricated, noncorrosive units designed to use with roof panels and complete with attachment system to raised panel seams..

2.6 FABRICATION

A. General: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated or conditions affecting performance of metal panel roofing.

1. Panel Supports and Anchorage: Examine roof framing to verify that purlins, angles, channels, and other secondary structural panel support members and anchorage have been installed according to written instructions of panel manufacturer.
2. Do not proceed with roof panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate metal panel roofing with rain drainage work; flashing; trim; and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

B. Promptly remove protective film, if any, from exposed surfaces of metal panels and accessories. Strip with care to avoid damage to finish.

C. Secondary Structural Supports: Install purlins, bracing, and other secondary structural panel support members and anchorage according to the Light Gage Structural Institute's "Guide Specifications," Section 07410, "Manufactured Roof and Wall Panels."

3.3 PANEL INSTALLATION

A. General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting exterior panels by torch is not permitted.
2. Install panels with a minimum 1/2:12 slope.
3. Accessories: Install components required for a complete roof panel assembly including trim, copings, fasciae, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items.

B. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized-asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

C. Install weatherseal under ridge cap. Flash and seal panels at eave and rake with rubber, neoprene, or other closures to exclude weather.

1. Seal panel end laps with double beads of tape or sealant, full width of panel.

D. Standing-Seam Roof Panel Assembly: Fasten panels to supports with concealed clip according to panel manufacturer's written instructions. Install clips at each support with self-drilling/self-tapping fasteners.

E. Seaming: Complete seaming of panel joints by operating portable power-driven equipment of type recommended by panel manufacturer to provide a weathertight joint.

F. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING AND PROTECTING

A. Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 72 mph ;
    c. fire;
    d. failure of roofing system substrate, including cracking,settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing;
    g. Roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
3. The Roofing Installer is responsible for damage to work covered by this Warranty ,
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation.
5. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
6. This Warranty is recognized to be the installation warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work

according to requirements of the Contract Documents and to coordinate the Manufacturer's warranty, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this<DAY>day of <MONTH>, 19<YEAR>.

1. Authorized Signature:
2. Name:
3. Title:

END OF SECTION 07411

SECTION 07412 - FLAT, STRUCTURAL, STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Flat, Standing-seam roof panels.

B. Related Sections include the following:

1. Division 5 Section "Cold-Formed Metal Framing" for metal framing.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide manufactured roof panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

B. Water Penetration: Provide manufactured roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward acting, wind-load design pressure of not less than 6.24 lb/sq. ft. (300 Pa) and not more than 12.0 lb/sq. ft. (575 Pa).

C. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for Class 90 wind-uplift resistance.

D. Structural Performance: Provide manufactured roof panel assemblies capable of safely supporting design loads indicated under in-service conditions with vertical deflection no greater than the following, based on testing manufacturer's standard units according to ASTM E 1592 by a qualified independent testing and inspecting agency.

1. Maximum Deflection: 1/180 of the span.

E. Loading Requirements: Provide all panels, supports, trims, and accessories to meet the following: BOCA Building Code, 1996 Edition

1. Roof Snow Load: 20 lbs. No tributory load reductions allowed.
2. Wind Load: 70 MPH - Exposure Factor B - Importance Factor 1
3. Sesmic Zone 1 - Importance Factor B
4. Collateral Load: 0 lbs.

1.5 SUBMITTALS

A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

B. Shop Drawings: Show layouts of panels on roof, details of edge conditions, joints, panel profiles, supports, anchorages, trim, flashings, underlayment, closures, snow guards, and special details. Distinguish between factory- and field-assembled work.

C. For installed products indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Samples for Initial Selection: Manufacturer's color charts or chips showing the full range of colors, textures, and patterns available for roof panels with factory-applied finishes.

E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Product Test Reports: Indicate compliance of manufactured roof panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Missouri and who is experienced in providing engineering services of the kind indicated.

C. Fire-Test-Response Characteristics: Where fire-resistance-rated roof panel assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against damage during transportation or handling.

B. Handling: Exercise care in unloading, storing, and erecting roof panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with their materials that might cause staining, denting, or other surface damage. Slope panels to drain.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal roof panels within the specified warranty period and agreeing to repair finish or replace roof panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

C. Finish Warranty Period: 20 years from date of Substantial Completion.

D. Special Weathertight System Warranty: **Submit a written warranty, signed by roofing system manufacturer agreeing to promptly repair leaks in the complete system including roof membrane and flashings, penetrations, curbs, accessories, etc., resulting from defects in materials or workmanship for the warranty period listed below. The manufacturer's liability shall not exceed the original installed cost of the roofing system. Indicate by letter that "All roofing components contained in the system proposed are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of the project if system is installed as designed.**

1. Warranty Period: 20 years.

The State of Missouri is prohibited by law from entering into binding arbitration. No warranty shall be submitted with any arbitration clause.

2. Warranty Period: 20 years.

E. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering roofing, insulation, fasteners, flashings, penetrations, curbs, accessories, etc, if any, for the following warranty period:

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal roof systems that are considered acceptable and may be incorporated into the Work include, but are not limited to, the following:

1. American Buildings Roofing and Architectural Products. - Loc-Seam panel
2. Butler Manufacturing Co. - VSR Roof System

3. Metal Building Components, Inc. SuperLok System
4. Steelox Roofing Systems, Inc - LRK (Steelox Panel)
5. Centria - System SDP-200

B. Substitutions: Any proposed substitution to the list above must be approved a minimum of 10 days in advance of bid date by submitting the "SUBSTITUTION REQUEST" form inclosed with bidding documents.

The product specifications listed in SECTIONS 2.2, and 2.3 are performance specifications indicating the minimum level of quality required to be considered as an "Acceptable Substitution."

2.2 PANEL FINISH

A. 24 gage Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by he hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755 . Color to be selected from manufacturer's full range of colors.

B. Pre-Painting to be Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil (0.023 mm) and 30 percent reflective gloss when tested according to ASTM D 523.

1. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of 5 Hunter units.

OR

C. 24 GAGE, Aluminum-Zinc Alloy-Coated Steel Sheet: (Galvalume or ALZN) ASTM A 792, Class AZ-50 oating, Grade 40 (ASTM A 792M, Class AZ-150 coating, Grade 275); structural quality.

2.3 PANEL CONSTRUCTION

A. Flat, Standing-Seam Roof Panels: Panels shall be 16 inch wide, factory-formed, standing-seam roof panel assembly designed for concealed mechanical attachment of panels to roof purlins or deck.. Panels shall be field seamed by machine creating a vertical lock seam. Panel seam must contain factory applied sealant. Panel seam must be a minimum of 2 inches above flat of panel.

B. Panel clips must be designed to allow for a minimum of one inch thermal expansion in each direction from nominal centered clip, two inches total expansion and contraction.

C. Purlin insulation blocks shall be installed along all roof structural members.

2.4 THERMAL INSULATION

A. Metal Building Insulation: NAIMA 202-96, glass-fiber-blanket insulation, thickness as indicated, with a flame-spread rating of 25 or less, and 3-inch- (50-mm-) wide, continuous, vapor-tight edge tabs.
Facing: CL 5010 OR WMP-10 Metallized, Polypropylene/scrim/kraft .

1. Perm rating shall be .02 perm

B. Support system: Insulation shall be installed using Central Glass Insulation, "INSUL BASKET" system or Thermal Design's, "Simple Saver System."

OR

C. Support system: Insulation shall be installed using Central Glass Insulation, "PERFECT R" system or Owens Corning, "Elaminator 300 Series"

2.5 ROOF ACCESSORIES

A. General: Provide materials and accessories required for a complete roof assembly and as recommended by manufacturer, unless otherwise indicated.

B. Accessories: Unless otherwise specified, provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

C. Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Snow Guards: Prefabricated, noncorrosive units designed to use with roof panels and complete with attachment to seam mechanism.

2.6 FABRICATION

A. General: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated or conditions affecting performance of metal panel roofing.

Panel Supports and Anchorage: Examine roof framing to verify that purlins, angles, channels, and other secondary structural panel support members and anchorage have been installed according to written instructions of panel manufacturer.

Do not proceed with roof panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate metal panel roofing with rain drainage work; flashing; trim; and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

B. Promptly remove protective film, if any, from exposed surfaces of metal panels and accessories. Strip with care to avoid damage to finish.

C. Secondary Structural Supports: Install purlins, bracing, and other secondary structural panel support members and anchorage according to the Light Gage Structural Institute's "Guide Specifications," Section 07410, "Manufactured Roof and Wall Panels."

3.3 PANEL INSTALLATION

A. General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

Field cutting exterior panels by torch is not permitted.

Install panels over a minimum 1/2:12 slope.

Accessories: Install components required for a complete roof panel assembly including trim, copings, fasciae, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items.

B. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized-asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

C. Install weatherseal under ridge cap. Flash and seal panels at eave and rake with rubber, neoprene, or other closures to exclude weather.

Seal panel end laps with double beads of tape or sealant, full width of panel.

D. Standing-Seam Roof Panel Assembly: Fasten panels to supports with concealed clip according to panel manufacturer's written instructions. Install clips at each support with self-drilling/self-tapping fasteners.

E. Seaming: Complete seaming of panel joints by operating portable power-driven equipment of type recommended by panel manufacturer to provide a weathertight joint.
Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING AND PROTECTING

A. Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner:
2. Address:

3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 72 mph ;
    c. fire;
    d. failure of roofing system substrate, including cracking,settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing;
    g. Roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
3. The Roofing Installer is responsible for damage to work covered by this Warranty ,
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation.
5. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
6. This Warranty is recognized to be the installation warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents and to coordinate the

Manufacturer's warranty, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this<DAY>day of <MONTH>, 19<YEAR>.

1. Authorized Signature:
2. Name:
3. Title:

END OF SECTION 07412

SECTION 07531 - EPDM MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Adhered EPDM membrane roofing system.
2. Roof walkway pads.
3. Roof insulation.

B. This Section includes the installation of acoustical roof deck rib insulation strips furnished under Division 5 Section "Steel Deck."

C. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.

D. Unit Prices: Refer to Division 1 Section "Unit Prices" for description of Work in this Section affected by unit prices.

E. Alternates: Refer to Division 1 Section “Alternates” for description of Work in this Section affected by Alternates.

F. Allowances: Refer to Division 1 Section “Allowances” for description of Work in this Section affected by Allowances.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," after multiplication by a safety factor.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-90, 72 MHP peak wind speed.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Insulation fastening patterns.

C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

E. Qualification Data: For Installer and manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

G. Maintenance Data: For roofing system to include in maintenance manuals.

H. Warranties: Special warranties specified in this Section.

I. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1. Installer must have a minimum of three (3) years experience installing the roof system specified.
2. Job Site Superintendent must have a minimum of 5 years experience in roofing.

B. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval for membrane roofing system identical to that used for this Project.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain components for membrane roofing system approved by roofing membrane manufacturer.

E. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

F. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Manufacturer’s Warranty: Manufacturer's form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories roof insulation fasteners cover boards walkway products and other components of roofing system.
2. Warranties that allow for arbitration are not acceptable.
3. Warranty must allow for litigation in the State of Missouri and be subject to Missouri law per Chapter 506, Section 506.500 of the Missouri Statutes.
4. Indicate by letter that “All roofing components exclusive of the deck are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of the project if system is installed as designed.”
5. Owner reserves the right to purchase a Twenty (20) year warranty for all of the roofs covered under the scope of work, up through the substantial completion of the project.
6. Warranty Period Requested: Fifteen (15) years from date of Substantial Completion.

B. Installers Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, ply sheets, base sheets, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:

1. The liability of the Surety Company under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the substantial completion date of the project. Any warranty beyond the first two years is an agreement between the owner and the contractor and falls outside the performance bond obligation.

2. Warranty Period: **Five (5) years** from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 EPDM ROOFING MEMBRANE

A. EPDM Roofing Membrane: ASTM D 4637, Type I, nonreinforced uniform, flexible sheet made from EPDM, and as follows:

1. Manufacturers:

a. Carlisle SynTec Incorporated.
b. Firestone Building Products Company.
c. GenFlex Roofing Systems.
d. Johns Manville International, Inc.
e. Stafast Roofing Products.
f. Versico Inc.

The manufacturer's listed in 2.2, are approved systems indicating the minimum level of quality required. To be considered as an "Acceptable Substitution." other systems must be approved 10 days in advance of bidding as per General Conditions.

2. Thickness: 60 mils, nominal.
3. Exposed Face Color: Black.

2.3 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

C. Bonding Adhesive: Manufacturer's standard bonding adhesive.

D. Seaming Material: Manufacturer's standard synthetic-rubber polymer primer and 3-inch- (75-mm-) wide minimum, butyl splice tape with release film.

E. Lap Sealant: Manufacturer's standard single-component sealant.

F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

G. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

H. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch (25 mm) wide by 0.05 inch (1.3 mm) thick, prepunched.

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

K. Liquid coating, specifically formulated for coating EPDM roofing membrane, as follows: (Delete this section unless MONG project requirement.)

1. Type: Hypalon.
2. Color: White.

2.4 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces.

1. Manufacturers:

a. Atlas Roofing Corporation.
b. Carlisle SynTec Incorporated.
c. Celotex Corporation.
d. Firestone Building Products Company.
e. GAF Materials Corp.
f. GenFlex Roofing Systems.
g. Johns Manville International, Inc.

C. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.

D. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches (1:48), unless otherwise indicated.

E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated with min. slope of ½ inch per 12 inches, unless otherwise indicated.

2.5 INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Low-Rise Foam Adhesive: Manufacturer's standard adhesive formulated to adhere roof insulation to substrate.

D. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, 1/2 inch (13 mm) thick.

2.6 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312, Type III, only to be used as insulation attachment.

B. Asphalt Primer: ASTM D 41.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 5 Section "Steel Deck."
4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
7. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m) and allow primer to dry.
2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Set each layer of insulation in a cold fluid-applied adhesive.

H. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

I. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
3. Install subsequent layers of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
4. Install subsequent layers of insulation in a manufacturer’s approved low-rise foam adhesive. Edit this section per project requirements.

J. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck.

1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install EPDM roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.

C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

I. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

J. Install roofing membrane and auxiliary materials to tie in to existing roofing.

3.5 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 COATING INSTALLATION

A. Apply coatings to [roofing membrane] [base flashings] according to manufacturer's written recommendations, by spray, roller, or other suitable application method. (Delete this section unless MONG project requirement.)

3.7 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

B. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.10 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner.**>
2. Address: <**Insert address.**>
3. Building Name/Type: <**Insert information.**>
4. Address: <**Insert address.**>
5. Area of Work: <**Insert information.**>
6. Acceptance Date: <**Insert date.**>
7. Warranty Period: <**Insert time.**>
8. Expiration Date: <**Insert date.**>

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 72 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work

according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature.**>
2. Name: <**Insert name.**>
3. Title: <**Insert title.**>

END OF SECTION 07531

SECTION 07550 – HYBRID MODIFIED BITUMEN MEMBRANE ROOF SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hybrid Modified Bitumen Membrane Roofing.
2. Roof insulation.
3. Cover board

B. Unit Prices: Refer to Division 1 Section "Unit Prices" for description of Work in this Section affected by unit prices.

C. Alternates: Refer to Division 1 Section “Alternates” for description of Work in this Section affected by Alternates.

D. Allowances: Refer to Division 1 Section “Allowances” for description of Work in this Section affected by Allowances.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg F (14 deg C), measured at the mop cart or mechanical spreader immediately before application.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-90, 72 MPH peak wind speed.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Sheathing Paper
2. Coated Heavy-Weight Base
3. Primer
4. Fasteners
5. Asphalt
6. Cold-Applied low-rise foam Adhesive (insulation attachment)
7. Asphalt Roofing Cement
8. Insulation
9. Coverboard
10. SBS Base Sheet
11. Type IV Interplies
12. SBS Cap Sheet (Hot-Applied)
13. SBS Cap Sheet (Cold-Applied)
14. SBS Cap Sheet Adhesive
15. APP Cap Sheet
16. APP Cap Sheet Adhesive
17. Modified Flashing Plies
18. Sealants and Mastic

B. System Spec Plate: Submit a manufacturer’s assembly spec plate depicting the ordering and attachment of the materials in the system.

1. Included with the spec plate, provide a narrative of the assembly including the application and attachment methods.
2. Narrative must include all system components from the deck up through the cap sheet.
3. Include manufacturer’s system spec number for roof system.

C. Shop Drawings: For tapered insulation layout and system details. Include plans, elevations, sections, details, and attachments as required to fully describe layout and details.

1. Base flashings, cants, and membrane terminations.
2. Tapered insulation, including slopes.
3. Crickets, saddles, and tapered edge strips, including slopes.
4. Insulation fastening patterns.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Upon request, submit evidence of meeting performance requirements.

F. Qualification Data: For the firm and persons completing the work.

1. Include lists of completed projects with the project names and addresses, names and addresses of architects and owners.

G. Maintenance Data: For roofing system to include in maintenance manuals.

H. Warranties: Special warranties specified in this Section.

I. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1. Installer must have a minimum of three (3) years experience installing the roof system specified.
2. Job Site Superintendent must have a minimum of five (5) years experience in roofing.

B. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval for a roofing system identical to the system specified for this Project.

C. Source Limitations: Obtain components for roofing system from or approved by the roofing system manufacturer.

D. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

E. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1. Store inside or covered with waterproof tarps to protect all pieces from any precipitation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Manufacturer’s Warranty: Manufacturer's form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories roof insulation fasteners cover boards walkway products and other components of roofing system.
2. Warranties that allow for arbitration are not acceptable.
3. Warranty must allow for litigation in the State of Missouri and be subject to Missouri law per Chapter 506, Section 506.500 of the Missouri Statutes.
4. Indicate by letter that “All roofing components exclusive of the deck are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of the project if system is installed as designed.”
5. Warranty Period Requested: **Fifteen (15) years** from date of Substantial Completion.
6. Owner reserves the right to purchase a **Twenty (20) year** warranty for all of the roofs covered under the scope of work, up through the substantial completion of the project.

B. Installers Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, ply sheets, base sheets, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:

1. The liability of the Surety Company under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the substantial completion date of the project. Any warranty beyond the first two years is an agreement between the owner and the contractor and falls outside the performance bond obligation.

2. Warranty Period: **Five (5) years** from date of Substantial Completion.

1.10 ROOF SYSTEM DESCRIPTION

A. Hybrid Modified Roofing System on Concrete Deck.

1. Primer, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, asphalt, SBS Modified Cap Sheet.
2. Primer, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, SBS Modified Cap Sheet.
3. Primer, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, APP Modified Cap Sheet.

B. Hybrid Modified Roofing System on Metal Deck.

1. Fastened insulation, Fastened insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, asphalt, SBS Modified Cap Sheet.
2. Fastened insulation, Fastened insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, SBS Modified Cap Sheet.
3. Fastened insulation, Fastened insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, APP Modified Cap Sheet.

C. Hybrid Modified Roofing System on Wood Deck or Wood Fiber Deck.

1. Fastened Sheathing Paper, Fastened Heavy-Weight base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, asphalt, SBS Modified Cap Sheet.
2. Fastened Sheathing Paper, Fastened Heavy-Weight base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, SBS Modified Cap Sheet.
3. Fastened Sheathing Paper, Fastened Heavy-Weight base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, APP Modified Cap Sheet.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Modified Bitumenous Membrane Roofing System Manufacturer’s:

a. Firestone Building Products Company.
b. CertainTeed Corporation.
c. GAF Materials Corporation.
d. Johns Manville International, Inc.
e. Performance Roofing Systems, Inc.

f. TAMKO Roofing Products, Inc.
g. Tremco, Inc.
h. Or an Approved Substitution.

B. Substitutions: Any proposed substitution to the list of Manufacturer's above must be approved a minimum of 10 days in advance of the bid date by submitting the **"SUBSTITUTION REQUEST"** form enclosed with the bidding documents.

1. No substitutions will be accepted for roof systems after the bid date.

2.2 MODIFIED ASPHALT CAP-SHEET

A. SBS Roofing Membrane Cap Sheet (Hot Applied): ASTM D 6164, Grade G, Type II, non woven polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS Premium FR Type II
b. Certainteed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium ER
g. Tremco: POWERply HE FR

B. SBS Roofing Membrane Cap Sheet (Cold Applied / Heat Welded Seams): ASTM D 6164, Grade G, Type II, non woven polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS Premium FR, Type II
b. CertainTeed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium ER
g. Tremco: POWERply HE FR

C. APP Roofing Membrane Cap Sheet (Cold Applied / Heat Welded Seams): ASTM D 6222, Grade G, Type I, non woven polyester-reinforced, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: APP 180 FR COOL
b. Certainteed: NA
c. GAF: NA
d. Johns Manville: Bicor M FR
e. Performance Roofing: Derbicolor GP FR
f. Tremco: POWERply HE FR or POWERply APP Deluxe

2.3 BASE-SHEET MATERIALS

A. Sheathing Paper (Wood Deck): Red-rosin type, minimum 3 lb/100 sq. ft

1. To be tacked to any wood or wood fiber deck below the insulation and Heavy-Weight base sheet as a slip sheet.

B. Coated Heavy Weight Base Sheet: ASTM D 4601, Type II, non-perforated, asphalt-impregnated and coated, glass-fiber reinforced sheet, dusted with fine mineral surfacing on both sides.

1. To be fastened to the wood or wood fiber deck through the sheathing paper to stop asphalt bleed-through.
2. Weight: 25 lb/100 sq. ft., minimum.
3. Acceptable Manufacturer's Products

a. Firestone: Venting Base
b. Certainteed: Glasbase Basesheet
c. GAF: #80 Ultima Base Sheet
d. Johns Manville: Perma Ply 28
e. Performance Roofing: PRS Glass Base
f. TAMKO: Versa-Base
g. TREMCO: POWERply Standard

C. SBS Modified Base Sheet: ASTM D 6163, Type II, Grade S, SBS modified Bitumen, glass-fiber reinforced base sheet as a base layer in a modified Bitumen roof assembly.

1. To be adhered between the coverboard and Type IV plies in a mopping of hot asphalt.
2. Acceptable Manufacturer's Products

a. Firestone: SBS BASE
b. Certainteed: Flexiglas FR Basesheet
c. GAF: Ruberoid Modified Base Sheet
d. Johns Manville: Dyna Base
e. Performance Roofing: NA
f. TAMKO: Versa-Base
g. TREMCO: POWERply HT Base

2.4 PLY SHEET MATERIALS

A. Glass-Fiber Ply Sheet: ASTM D 2178, Type **IV**, asphalt-impregnated, glass-fiber felt.

1. Type IV interplies to be adhered in hot asphalt between the base sheet and cap sheet.
2. Acceptable Manufacturer's Products

a. Firestone: PLY IV (4) M
b. Certainteed: Flintglas Type IV Plysheet

c. GAF: GAFGLAS PLY 4
d. Johns Manville: Glas Ply IV
e. Performance Roofing: PRS Glass Ply IV
f. TAMKO: TAM PLY IV
g. TREMCO: Thermglass Type IV

2.5 BASE FLASHING SHEET MATERIALS

A. SBS Flashing Sheet (Hot Asphalt Application): ASTM D 6164, Grade G, Type II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Thickness: 160 mil
2. Granule Color: White.
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS PREM FR
b. Certainteed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 180 S
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium
g. TREMCO: POWERply HE FR

B. SBS Flashing Sheet (Cold-Applied Application): ASTM D 6164, Grade G, Type II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Thickness: 160 mil
2. Granule Color: White.
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: _SBS PREM FR
b. Certainteed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium ER
g. TREMCO: POWERply HE FR

C. APP Flashing Sheet (Cold-Applied Application): ASTM D 6222, Grade G, Type I, non woven polyester-reinforced, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: _APP 180 FR COOL
b. Certainteed: NA
c. GAF: NA

d. Johns Manville: Bicor M FR
e. Performance Roofing: Derbicolor GP FR
f. TAMKO: Awaplan Premium ER
g. TREMCO: POWERply HE FR

2.6 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

B. Asphalt Primer: ASTM D 41.

C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application.

D. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings.

E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application. To be used only if approved for application by the manufacturer under the project parameters.

F. Mastic Sealant: Polyisobutylene, plain or modified Bitumen, non-hardening, non-migrating, non-skinning, and nondrying.

G. Mechanical Fasteners (Wood and Metal Deck Only): Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

H. Concrete Drive Fastener (Concrete Deck): Factory coated steel fasteners and metal or plastic plates meeting the corrosion resistance provisions in FMG 4470, designed for fastening roofing membrane components to structural concrete decks greater than 3” thick, tested by manufacturer for required pullout strength, and acceptable to roof system manufacturer.

I. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."

J. Roofing Granules: To match the factory applied granules on the cap sheet installed.

K. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.7 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, glass-fiber mat facer on both major surfaces.

1. Preformed units to fit applications indicated, selected from the manufacturer’s standard thicknesses, widths, and lengths.

2. Manufacturers:

    a. Atlas Roofing Corporation.
    b. Firestone Building Products Company.
    c. GAF Materials Corporation.
    d. Johns Manville International, Inc.
    e. Certainteed Corp.
    f. Approved Equal and acceptable to Roof System Manufacturer.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated, by the same manufacturer of the Polyisocyanurate board insulation.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Asphalt Primer (Concrete and Masonry Application): ASTM D 41.

C. Mechanical Fasteners (Wood and Metal Deck Only): Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane and insulation components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

D. Concrete Drive Fastener (Concrete Deck): Factory coated steel fasteners and metal or plastic plates meeting the corrosion resistance provisions in FMG 4470, designed for fastening roofing membrane and insulation components to structural concrete decks greater than 3” thick, tested by manufacturer for required pullout strength, and acceptable to roof system manufacturer.

E. Cold Fluid-Applied Low-Rise Foam Adhesive: Manufacturer's standard cold fluid-applied low-rise foam adhesive formulated to adhere roof insulation to substrate.

F. Insulation Cant Strips: ASTM C 728, perlite insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer.

G. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer.

H. Wood Cant Strip: Comply with the requirement in Division 6, Section [Rough Carpentry] [Miscellaneous Carpentry].”

I. Wood Nailer Strips: Comply with requirements in Division 6 Section "[**Rough Carpentry**] [**Miscellaneous Carpentry**]."

J. Tapered Edge Strips: ASTM C 728, perlite insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer.

K. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer.

L. Cover Board: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board, ½-inch thick.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer.

M. Cover Board: ASTM C 728, perlite insulation board, 3/4-inch thick, with top surface seal-coated.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer.

2.9 WALKWAYS

A. SBS Walkway Cap Sheet Strips (Hot Applied Application): ASTM D 6164, Grade G, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: Contrasting color to the granules on the cap sheet installed.
2. Acceptable Manufacturer's Products

    a. Firestone: _SBS CAP
    b. Certainteed: Flintlastic GMS
    c. GAF: Ruberoid Mop
    d. Johns Manville: Dynalastic 250 FR
    e. Performance Roofing: NA
    f. TAMKO: Awaplan Premium ER
    g. TREMCO: POWERply Standard

B. SBS Walkway Cap Sheet Strips (Cold Applied Application): ASTM D 6164, Grade G, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: Contrasting color to the granules on the cap sheet installed.
2. Acceptable Manufacturer's Products

    a. Firestone: _SBS CAP
    b. Certainteed: Flintlastic GMS
    c. GAF: Ruberoid Mop
    d. Johns Manville: Dynalastic 250 FR
    e. Performance Roofing: NA
    f. TAMKO: Awaplan Premium ER
    g. TREMCO: POWERply Standard

C. APP Walkway Cap Sheet Strips (Cold-Applied Application): ASTM D 6222, Grade G, Type I, non woven polyester-reinforced, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Acceptable Manufacturer’s Products

    a. Firestone: APP 180 COOL
    b. Certainteed: NA
    c. GAF: NA
    d. Johns Manville: Bicor M FR
    e. Performance Roofing: Derbicolor GP
    f. TAMKO: NA
    g. TREMCO: POWERply APP FR

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with the roof system manufacturer’s requirements
4. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
5. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

    a. Test for moisture by pouring 1 pint of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.

6. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
7. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft and allow primer to dry.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

1. Install roofing system per the approved Spec plate and narrative that was submitted by the contractor and approved by the designer per this specification section under require submittals.

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel when required by the manufacturer or when requested by the designer or owner’s representative.

C. Where roof slope exceeds 1/2 inch per 12 inches, install roofing membrane sheets parallel with slope.

1. Backnail roofing membrane sheets to [**nailer strips**] [**substrate**] according to roofing system manufacturer's written instructions.

D. Cooperate with the construction administrator and allow for inspection of the roof system as it is being installed.

E. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

F. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.

G. Absolutely **No Torching** of the membrane, flashing plies or any other components will be allowed.

1. Do not use a torch to dry any substrate unless pre-approved and as directed by the owner’s representative with approval from the designer.

H. **Heat Welding** of seams will be permitted on cold-applied membrane cap sheets and flashing plies as required by the manufacturer.

I. Coordinate installing roof accessories, blocking, and nailers that are integral with the roof system.

1. Temporarily flash until permanent flashing or similar measures can be put in place to prevent water from entering the roof system or building below.

J. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 SLIP SHEET INSTALLATION

A. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of 2 inches and 6 inches, respectively. Minimally tack to deck to hold in place.

3.5 HEAVY WEIGHT BASE SHEET INSTALLATION

A. Install one lapped coated heavy-weight base sheet course on top of the slip sheet and mechanically fasten to substrate according to roofing system manufacturer's written instructions and in accordance with the FMG requirements for this project.

3.6 INSULATION INSTALLATION

A. Comply with roofing system manufacturer's written instructions for installing roof insulation.

B. Nailer Strips: Mechanically fasten 4-inch nominal- width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:

1. 16 feet apart for roof slopes greater than 1 inch per 12 inches (1:12) but less than 3 inches per 12 inches (3:12).

C. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Install tapered insulation on roof to conform to slopes indicated or as indicated on approved shop drawings.

F. Install sumps at all interior drain locations measuring 30-inches by 30-inches as measured from the centerline of the drain.

G. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

H. Adhered Insulation (Concrete Decks and Wood Plank / Wood Fiber decks): Install each layer of insulation and adhere to substrate as follows:

1. Set each layer of insulation in a solid mopping of hot roofing asphalt.
2. Set each layer of insulation in a cold fluid-applied low-rise foam adhesive.

I. Mechanically Fastened Insulation (Metal Decks): Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

J. Mechanically Fastened and Adhered Insulation (Metal decks): Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
2. Install subsequent layers of insulation in a solid mopping of hot roofing asphalt.
3. Install subsequent layers of insulation in a cold fluid-applied low-rise foam adhesive.

K. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and secure to roof deck.

1. Install in a mopping of hot roofing asphalt and immediately bond to previous layer of insulation.
2. Install in a cold fluid-applied low-rise foam adhesive to the top of the previous layer of insulation as recommended by the roof system manufacturer.

L. Preformed Saddles and Crickets: Install and secure preformed saddles and crickets where indicated and secure as follows:

1. Install in a mopping of hot roofing asphalt and immediately bond to substrate
2. Install in a cold fluid-applied low-rise foam adhesive as recommended by the roof system manufacturer.

M. Insulation Cant Strips: Install and secure, 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.

1. Install in a mopping of hot roofing asphalt and immediately bond to substrate
2. Install in a cold fluid-applied low-rise foam adhesive as recommended by the roof system manufacturer.

N. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

1. Install in a mopping of hot roofing asphalt and immediately bond to substrate
2. Install in a cold fluid-applied low-rise foam adhesive as recommended by the roof system manufacturer.

3.7 SBS BASE-SHEET INSTALLATION

A. Install lapped SBS base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Adhere to substrate in a solid mopping of hot roofing asphalt.

3.8 TYPE IV PLY SHEET INSTALLATION

A. Install two (2) glass-fiber TYPE IV ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Shingle side laps of glass-fiber base-ply sheets uniformly to ensure required

number of glass-fiber base-ply sheets covers substrate at any point. Shingle in direction to shed water. Extend glass-fiber base-ply sheets over and terminate beyond cants.

1. Embed each glass-fiber ply sheet in a continuous mopping of hot roofing asphalt, to form a uniform membrane without glass-fiber ply sheets touching.

3.9 SBS-MODIFIED BITUMENOUS MEMBRANE CAP SHEET INSTALLATION (HOT ASPHALT OR COLD-APPLIED)

A. Install SBS modified Bitumenous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing cap sheet over and terminate beyond cants, installing as follows:

1. Unroll roofing cap sheets and allow them to relax for time period required by manufacturer.
2. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F.
3. Adhere to preceding plies in cold-applied adhesive.
4. Prepare and seal seams per the manufacturer’s written instructions.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.
2. Apply roofing granules to cover bleed-out at laps while material is hot.

C. Install roofing membrane sheets so side and end laps shed water.

3.10 APP-MODIFIED BITUMENOUS MEMBRANE CAP SHEET INSTALLATION (COLD-APPLIED)

A. Install modified Bitumenous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing cap sheet over and terminate beyond cants, installing as follows:

1. Unroll roofing cap sheets and allow them to relax for time period required by manufacturer.
2. Adhere to preceding plies in cold-applied adhesive.
3. Heat Weld all seams per the manufacturer’s written instructions (NO TORCHING ALLOWED)

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.
2. Apply roofing granules to cover bleed-out at laps while material is hot.

C. Install roofing membrane sheets so side and end laps shed water.

3.11 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
3. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer and heat weld all seams.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

1. Seal top termination of base flashing or extend up, and over parapet and fasten to the outside of the parapet.

D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

1. Install stripping according to roofing system manufacturer's written instructions.

3.12 WALKWAY INSTALLATION

A. Walkway Cap Sheet Strips: Install roofing membrane walkway cap sheet strips over roofing membrane [**in hot roofing asphalt applied at not less than 425 deg F**] [**in cold-applied adhesive**].

3.13 FIELD QUALITY CONTROL

A. A Punch walk-thru by the Designer and Construction Administrator is required at the time of substantial completion.

1. Notify the Construction Administrator and Designer at least 5 days prior to the date and time of the inspection
2. A punch list will be issued by the designer indicating any deficiencies noted in the installation and damages caused by the contractor.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Repair or replace items damaged caused by the contractor or subcontractors.

E. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements when necessary.

3.14 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Protect other roof areas adjacent to the work from damage due to construction operations.

D. Do not store materials on or traffic roofs that are not part of the scope of work without approval.

E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures that will not damage or discolor the materials being cleaned.

3.15 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work on the following project:

1. Owner: **_State of Missouri_____**
2. Address: **_P.O. Box 809, 301 West High Street Jefferson City, Missouri 65102_____**
3. Building Name/Type: _____
4. Address: _____
5. Area of Work: _____
6. Acceptance Date: _____
7. Warranty Period: **_Five (5) Years from the date of substantial completion._____**
8. Expiration Date: _____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 72 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. vapor condensation on bottom of roofing; and
g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. The liability of the Surety Company under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the substantial completion date of the project. Any warranty beyond the first two years is an agreement between the owner and the contractor and falls outside the performance bond obligation.

8. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20_____.

1. Authorized Signature: _____
2. Name: _____
3. Title: _____

END OF SECTION 07552

SECTION 07550 – HYBRID MODIFIED BITUMEN MEMBRANE ROOF SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hybrid Modified Bitumen Membrane Roofing.
2. Roof insulation.
3. Cover board

B. Unit Prices: Refer to Division 1 Section "Unit Prices" for description of Work in this Section affected by unit prices.

C. Alternates: Refer to Division 1 Section “Alternates” for description of Work in this Section affected by Alternates.

D. Allowances: Refer to Division 1 Section “Allowances” for description of Work in this Section affected by Allowances.

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg F (14 deg C), measured at the mop cart or mechanical spreader immediately before application.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-90, 72 MPH peak wind speed.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Sheathing Paper
2. Coated Heavy-Weight Base
3. Venting Base Sheet
4. Primer
5. Fasteners
6. Asphalt
7. Cold-Applied low-rise foam Adhesive (insulation attachment)
8. Asphalt Roofing Cement
9. Insulation
10. Cover board
11. SBS Base Sheet
12. Type IV Interplies
13. SBS Cap Sheet (Hot-Applied)
14. SBS Cap Sheet (Cold-Applied)
15. SBS Cap Sheet Adhesive
16. APP Cap Sheet
17. APP Cap Sheet Adhesive
18. Modified Flashing Plies
19. Sealants and Mastic

B. System Spec Plate: Submit a manufacturer’s assembly spec plate depicting the ordering and attachment of the materials in the system.

1. Included with the spec plate, provide a narrative of the assembly including the application and attachment methods.
2. Narrative must include all system components from the deck up through the cap sheet.
3. Include manufacturer’s system spec number for roof system.

C. Shop Drawings: For tapered insulation layout and system details. Include plans, elevations, sections, details, and attachments as required to fully describe layout and details.

1. Base flashings, cants, and membrane terminations.
2. Tapered insulation, including slopes.
3. Crickets, saddles, and tapered edge strips, including slopes.
4. Insulation fastening patterns.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Upon request, submit evidence of meeting performance requirements.

F. Qualification Data: For the firm and persons completing the work.

1. Include lists of completed projects with the project names and addresses, names and addresses of architects and owners.

G. Maintenance Data: For roofing system to include in maintenance manuals.

H. Warranties: Special warranties specified in this Section.

I. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1. Installer must have a minimum of three (3) years experience installing the roof system specified.
2. Job Site Superintendent must have a minimum of five (5) years experience in roofing.

B. Manufacturer Qualifications: A qualified manufacturer that has UL listing and FMG approval for a roofing system identical to the system specified for this Project.

C. Source Limitations: Obtain components for roofing system from or approved by the roofing system manufacturer.

D. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

E. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Architect, Owner, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1. Store inside or covered with waterproof tarps to protect all pieces from any precipitation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Manufacturer’s Warranty: Manufacturer's form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories roof insulation fasteners cover boards walkway products and other components of roofing system.
2. Warranties that allow for arbitration are not acceptable.
3. Warranty must allow for litigation in the State of Missouri and be subject to Missouri law per Chapter 506, Section 506.500 of the Missouri Statutes.
4. Indicate by letter that “All roofing components exclusive of the deck are approved and compatible with the warranty requirements of the roof system as specified, and that the warranty specified will be issued at completion of the project if system is installed as designed.”
5. Warranty Period Requested: **Fifteen (15) years** from date of Substantial Completion.
6. Owner reserves the right to purchase a **Twenty (20) year** warranty for all of the roofs covered under the scope of work, up through the substantial completion of the project.

B. Installers Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, ply sheets, base sheets, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:

1. The liability of the Surety Company under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the substantial completion date of the project. Any warranty beyond the first two years is an agreement between the owner and the contractor and falls outside the performance bond obligation.

2. Warranty Period: **Five (5) years** from date of Substantial Completion.

1.10 ROOF SYSTEM DESCRIPTION

A. Hybrid Modified Roofing System on Lightweight Insulating Fill Deck.

1. Venting Base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, asphalt, SBS Modified Cap Sheet.
2. Venting Base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, SBS Modified Cap Sheet.
3. Venting Base Sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, APP Modified Cap Sheet.

B. Hybrid Modified Roofing System on Poured Gypsum Deck.

1. Venting Base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, asphalt, SBS Modified Cap Sheet.
2. Venting Base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, SBS Modified Cap Sheet.
3. Venting Base Sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, APP Modified Cap Sheet.

C. Hybrid Modified Roofing System on Pre-cast Gypsum deck.

1. Venting Base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, asphalt, SBS Modified Cap Sheet.
2. Venting Base sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, SBS Modified Cap Sheet.
3. Venting Base Sheet, asphalt, insulation, asphalt, insulation, asphalt, cover board, asphalt, base sheet, asphalt, ply sheet, asphalt, ply sheet, cold-applied adhesive, APP Modified Cap Sheet.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Modified Bitumenous Membrane Roofing System Manufacturer’s:

a. Firestone Building Products Company.
b. CertainTeed Corporation.

c. GAF Materials Corporation.
d. Johns Manville International, Inc.
e. Performance Roofing Systems, Inc.
f. Tremco, Inc.
g. Or an Approved Substitution.

B. Substitutions: Any proposed substitution to the list of Manufacturer's above must be approved a minimum of 10 days in advance of the bid date by submitting the **"SUBSTITUTION REQUEST"** form enclosed with the bidding documents.

1. No substitutions will be accepted for roof systems after the bid date.

2.2 MODIFIED ASPHALT CAP-SHEET

A. SBS Roofing Membrane Cap Sheet (Hot Applied): ASTM D 6164, Grade G, Type I, non woven polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS Premium FR Type II
b. Certainteed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium ER
g. Tremco: POWERply HE FR

B. SBS Roofing Membrane Cap Sheet (Cold Applied / Heat Welded Seams): ASTM D 6164, Grade G, Type I, non woven polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS Premium FR Type II
b. CertainTeed: Flintlastic FR-P
c. GAF: Ruberoid 170 FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium FR
g. Tremco: POWERply HE FR

C. APP Roofing Membrane Cap Sheet (Cold Applied / Heat Welded Seams): ASTM D 6222, Grade G, Type I, non woven polyester-reinforced, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum

3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

    a. Firestone: APP 180 FR COOL
    b. Certainteed: NA
    c. GAF: NA
    d. Johns Manville: Bicor M FR
    e. Performance Roofing: Derbicolor GP FR
    f. TAMKO: NA
    g. Tremco: POWERply APP FR or POWERply APP Deluxe

2.3 BASE-SHEET MATERIALS

A. Venting Base Sheet: ASTM D 4897, Type II, venting, nonperforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface.

1. To be mechanically fastened to deck with roof system manufacturer's approved fasteners.
2. Weight: 55 lb/100 sq. ft., minimum.
3. Acceptable Manufacturer's Products

    a. Firestone: Venting Base
    b. Certainteed: Channel Vent Base Sheet
    c. GAF: Stratavent Nailable
    d. Johns Manville: Ventsulation Felt
    e. Performance Roofing: PRS Vented Base Sheet
    f. TAMKO: Vapor Chan
    g. TREMCO: POWERply Standard

B. SBS Modified Base Sheet: ASTM D 6163, Type I, Grade S, SBS modified Bitumen, glass-fiber reinforced base sheet as a base layer in a modified Bitumen roof assembly.

1. To be adhered between the coverboard and Type IV plies in a mopping of hot asphalt.
2. Acceptable Manufacturer's Products

    a. Firestone: SBS BASE
    b. Certainteed: Flexiglas FR Base Sheet
    c. GAF: Ruberoid 20
    d. Johns Manville: Dyna Base
    e. Performance Roofing: NA
    f. TAMKO: Versa-Base
    g. TREMCO: POWERply HE Base

2.4 PLY SHEET MATERIALS

A. Glass-Fiber Ply Sheet: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt.

1. Type IV interplies to be adhered in hot asphalt between the base sheet and cap sheet.
2. Acceptable Manufacturer's Products

    a. Firestone: PLY IV (4) M
    b. Certainteed: Flintglas Ply IV Plysheet
    c. GAF: GAFGLAS PLY 4
    d. Johns Manville: Glas Ply IV

e. Performance Roofing: PRS Ply IV
f. TAMKO: TAM PLY IV
g. TREMCO: Thermglass Type IV

2.5 BASE FLASHING SHEET MATERIALS

A. SBS Flashing Sheet (Hot Asphalt Application): ASTM D 6164, Grade G, Type I, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Thickness: 160 mil
2. Granule Color: White.
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS PREM FR
b. Certainteed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium
g. TREMCO: POWERply HE FR

B. SBS Flashing Sheet (Cold-Applied Application): ASTM D 6164, Grade G, Type I, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Thickness: 160 mil
2. Granule Color: White.
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: SBS PREM FR
b. Certainteed: Flintlastic FR-P
c. GAF: Ruberoid Mop FR
d. Johns Manville: Dynalastic 250 FR
e. Performance Roofing: NA
f. TAMKO: Awaplan Premium ER
g. TREMCO: POWERply HE FR

C. APP Flashing Sheet (Cold-Applied Application): ASTM D 6222, Grade G, Type I, non woven polyester-reinforced, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Fire Resistant Sheet
4. Acceptable Manufacturer's Products

a. Firestone: APP 180 FR COOL
b. Certainteed: NA
c. GAF: NA
d. Johns Manville: Bicor M FR
e. Performance Roofing: Derbicolor GP FR

f. TREMCO: POWERply APP FR or POWERply APP Deluxe

2.6 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

B. Asphalt Primer: ASTM D 41.

C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application.

D. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings.

E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application. To be used only if approved for application by the manufacturer under the project parameters.

F. Mastic Sealant: Polyisobutylene, plain or modified Bitumen, non-hardening, non-migrating, non-skinning, and nondrying.

G. Mechanical Fasteners for **[Lightweight Insulating fill or Gypsum Decks]**: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

H. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."

I. Roofing Granules: To match the factory applied granules on the cap sheet installed.

J. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.7 ROOF INSULATION

A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, glass-fiber mat facer on both major surfaces.

1. Preformed units to fit applications indicated, selected from the manufacturer’s standard thicknesses, widths, and lengths.
2. Manufacturers:

a. Atlas Roofing Corporation.
b. Firestone Building Products Company.
c. GAF Materials Corporation.
d. Johns Manville International, Inc.
e. Certainteed Corp.
f. Approved Equal and acceptable to Roof System Manufacturer.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated, by the same manufacturer of the Polyisocyanurate board insulation.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application.

C. Cold Fluid-Applied Low-Rise Foam Adhesive: Manufacturer's standard cold fluid-applied low-rise foam adhesive formulated to adhere roof insulation to substrate.

D. Insulation Cant Strips: ASTM C 728, perlite insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer

E. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer

F. Wood Cant Strip: Comply with the requirement in Division 6, Section [Rough Carpentry] [Miscellaneous Carpentry]."

G. Tapered Edge Strips: ASTM C 728, perlite insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer

H. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer

I. Cover Board: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board, ½-inch thick.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer

J. Cover Board: ASTM C 728, perlite insulation board, 3/4-inch thick, with top surface seal-coated.

1. Approved for use in a Class A roof system.
2. Approved for use in the roof assembly by the roof system manufacturer

2.9 WALKWAYS

A. SBS Walkway Cap Sheet Strips (Hot Applied Application): ASTM D 6164, Grade G, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: Contrasting color to the granules on the cap sheet installed.
2. Acceptable Manufacturer's Products

    a. Firestone: SBS CAP
    b. Certainteed: Flintlastic GMS
    c. GAF: Ruberoid Mop
    d. Johns Manville: Dynalastic 250 FR
    e. Performance Roofing: NA
    f. TAMKO: Awaplan Premium ER
    g. TREMCO: POWERply Standard

B. SBS Walkway Cap Sheet Strips (Cold Applied Application): ASTM D 6164, Grade G, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: Contrasting color to the granules on the cap sheet installed.
2. Acceptable Manufacturer's Products

    a. Firestone: SBS CAP
    b. Certainteed: Flintlastic GMS
    c. GAF: Ruberoid Mop
    d. Johns Manville: Dynalastic 250 FR
    e. Performance Roofing: NA
    f. TAMKO: Awaplan Premium ER
    g. TREMCO: POWERply Standart

C. APP Walkway Cap Sheet Strips (Cold-Applied Application): ASTM D 6222, Grade G, Type I, non woven polyester-reinforced, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.
2. Thickness 160 mils minimum
3. Acceptable Manufacturer's Products

    a. Firestone: APP 180 COOL
    b. Certainteed: NA
    c. GAF: NA
    d. Johns Manville: Bicor M FR
    e. Performance Roofing: Derbicolor GP
    f. TREMCO: POWERply APP FR

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that concrete substrate is visibly dry and free of moisture.
4. Test for moisture as recommended by the roof system manufacturer.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."

1. Install roofing system per the approved Spec plate and narrative that was submitted by the contractor and approved by the designer per this specification section under required submittals.

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel when required by the manufacturer or when requested by the designer or owner’s representative.

C. Where roof slope exceeds 1/2 inch per 12 inches, install roofing membrane sheets parallel with slope.

D. Cooperate with the construction administrator and allow for inspection of the roof system as it is being installed.

E. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

F. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.

G. Absolutely **No Torching** of the membrane, flashing plies or any other components will be allowed.

1. Do not use a torch to dry any substrate unless pre-approved and as directed by the owner's representative with approval from the designer.

H. **Heat Welding** of seams will be permitted on cold-applied membrane cap sheets and flashing plies as required by the manufacturer.

I. Coordinate installing roof accessories, blocking, and nailers that are integral with the roof system.

1. Temporarily flash until permanent flashing or similar measures can be put in place to prevent water from entering the roof system or building below.

J. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.4 VENTING BASE SHEET INSTALLATION

A. Install one lapped Venting Base Sheet course and mechanically fasten to substrate according to roofing system manufacturer's written instructions and in accordance with the FMG requirements for this project.

3.5 INSULATION INSTALLATION

A. Comply with roofing system manufacturer's written instructions for installing roof insulation.

B. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

C. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

D. Install tapered insulation on roof to conform to slopes indicated or as indicated on approved shop drawings.

E. Install sumps at all interior drain locations measuring 30-inches by 30-inches as measured from the centerline of the drain.

F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

G. Adhered Insulation: Install each layer of insulation and adhere to venting base sheet and preceding insulation layers as follows:

1. Set each layer of insulation in a solid mopping of hot roofing asphalt.
2. Set each layer of insulation in a cold fluid-applied low-rise foam adhesive.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and secure to roof deck.

1. Install in a mopping of hot roofing asphalt and immediately bond to previous layer of insulation or venting base sheet.
2. Install in a cold fluid-applied low-rise foam adhesive to the top of the previous layer of insulation or to the venting base sheet as recommended by the roof system manufacturer.

I. Preformed Saddles and Crickets: Install and secure preformed saddles and crickets where indicated and secure as follows:

1. Install in a mopping of hot roofing asphalt and immediately bond to substrate
2. Install in a cold fluid-applied low-rise foam adhesive as recommended by the roof system manufacturer.

J. Insulation Cant Strips: Install and secure, 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.

1. Install in a mopping of hot roofing asphalt and immediately bond to substrate
2. Install in a cold fluid-applied low-rise foam adhesive as recommended by the roof system manufacturer.

K. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

1. Install in a mopping of hot roofing asphalt and immediately bond to substrate
2. Install in a cold fluid-applied low-rise foam adhesive as recommended by the roof system manufacturer.

3.6 SBS BASE-SHEET INSTALLATION

A. Install lapped SBS base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:

1. Adhere to substrate in a solid mopping of hot roofing asphalt.

3.7 TYPE IV PLY SHEET INSTALLATION

A. Install two (2) glass-fiber TYPE IV ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Shingle side laps of glass-fiber base-ply sheets uniformly to ensure required number of glass-fiber base-ply sheets covers substrate at any point. Shingle in direction to shed water. Extend glass-fiber base-ply sheets over and terminate beyond cants.

1. Embed each glass-fiber ply sheet in a continuous mopping of hot roofing asphalt, to form a uniform membrane without glass-fiber ply sheets touching.

3.8 SBS-MODIFIED BITUMENOUS MEMBRANE CAP SHEET INSTALLATION (HOT ASPHALT OR COLD-APPLIED)

A. Install SBS modified Bitumenous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing cap sheet over and terminate beyond cants, installing as follows:

1. Unroll roofing cap sheets and allow them to relax for time period required by manufacturer.

2. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F.
3. Adhere to preceding plies in cold-applied adhesive.
4. Prepare and seal seams per the manufacturer’s written instructions.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.
2. Apply roofing granules to cover bleed-out at laps while material is hot.

C. Install roofing membrane sheets so side and end laps shed water.

3.9 APP-MODIFIED BITUMENOUS MEMBRANE CAP SHEET INSTALLATION (COLD-APPLIED)

A. Install modified Bitumenous roofing cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing cap sheet over and terminate beyond cants, installing as follows:

1. Unroll roofing cap sheets and allow them to relax for time period required by manufacturer.
2. Adhere to preceding plies in cold-applied adhesive.
3. Heat Weld all seams per the manufacturer’s written instructions (NO TORCHING ALLOWED)

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

1. Repair tears and voids in laps and lapped seams not completely sealed.
2. Apply roofing granules to cover bleed-out at laps while material is hot.

C. Install roofing membrane sheets so side and end laps shed water.

3.10 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
3. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer and heat weld all seams.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

1. Seal top termination of base flashing or extend up, and over parapet and fasten to the outside of the parapet.

D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

1. Install stripping according to roofing system manufacturer's written instructions.

3.11 WALKWAY INSTALLATION

A. Walkway Cap Sheet Strips: Install roofing membrane walkway cap sheet strips over roofing membrane [**in hot roofing asphalt applied at not less than 425 deg F**] [**in cold-applied adhesive**].

3.12 FIELD QUALITY CONTROL

A. A Punch walk-thru by the Designer and Construction Administrator is required at the time of substantial completion.

1. Notify the Construction Administrator and Designer at least 5 days prior to the date and time of the inspection
2. A punch list will be issued by the designer indicating any deficiencies noted in the installation and damages caused by the contractor.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Repair or replace items damaged caused by the contractor or subcontractors.

E. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements when necessary.

3.13 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Protect other roof areas adjacent to the work from damage due to construction operations.

D. Do not store materials on or traffic roofs that are not part of the scope of work without approval.

E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures that will not damage or discolor the materials being cleaned.

3.14 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work on the following project:

1. Owner: **_State of Missouri_____**
2. Address: **_P.O. Box 809, 301 West High Street Jefferson City, Missouri 65102_____**
3. Building Name/Type: _____
4. Address: _____
5. Area of Work: _____
6. Acceptance Date: _____
7. Warranty Period: **_Five (5) Years from the date of substantial completion._____**
8. Expiration Date: _____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 72 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. The liability of the Surety Company under the installer warranty provisions of this contract is limited to correcting defective workmanship and materials for a period of two years from the substantial completion date of the project. Any warranty beyond the first two years is an agreement between the owner and the contractor and falls outside the performance bond obligation.
8. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20_____.

1. Authorized Signature: _____
2. Name: _____
3. Title: _____

END OF SECTION 07552

Pre-Installation Conference

A. Pre-Installation Conference: No earlier than 2 weeks before installing roofing system, conduct conference at Project site to review the items described below. Notify participants at least 5 working days before conference. All submittals are to be approved prior to meeting.

1. Meet with Construction Administrator; Architect; and Agency; roofing Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.

4. Review loading limitations of deck during and after roofing.

5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.

6. Review temporary protection requirements for roofing system during installation.

7. Review roof observation and repair procedures after roofing installation.

8. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

PRODUCT SUBSTITUTION REQUEST

PROJECT NUMBER

PROJECT TITLE

CHECK APPROPRIATE BOX

☐ SUBSTITUTION PRIOR TO BID OPENING
(Minimum of 5 working days prior to receipt of bids as per Article 4 – Instructions to Bidders)

☐ SUBSTITUTION FOLLOWING AWARD
(Maximum of 20 working days from Notice to Proceed as per article 16 – General Conditions)

FROM: BIDDER/CONTRACTOR (PRINT COMPANY NAME)

TO: ARCHITECT/ENGINEER (PRINT COMPANY NAME)

Bidder/contractor hereby requests acceptance of the following product or systems as a substitution in accord with provisions of Division One of the bidding documents:

SPECIFIED PRODUCT OR SYSTEM

SPECIFICATION SECTION NO.

SUPPORTING DATA:

☐ Product data for proposed substitution is attached. (Include description of product, standards, performance and test data)

☐ Sample ☐ Sample will be sent if requested.

QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION REQUEST
NAME, BRAND		
CATALOG NO.		
MANUFACTURER		
VENDOR		

PREVIOUS INSTALLATIONS

PROJECT

ARCHITECT/ENGINEER

LOCATION

DATE INSTALLED

SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT

REASON FOR SUBSTITUTION

DOES PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK?

☐ YES ☐ NO

IF YES, EXPLAIN

SUBSTITUTION REQUIRES DIMENSIONAL REVISION OR REDESIGN OF STRUCTURE OR A/E WORK

☐ YES ☐ NO

BIDDER'S/CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENT:

We have investigated the proposed substitution. We believe that it is equal or superior in all respects to specified product, except as stated above; that it will provide the same warranty as specified product; that we have included complete implications of the substitution; that we will pay redesign and other costs caused by the substitution which subsequently become apparent; and that we will pay costs to modify other parts of the work as may be needed, to make all parts of the Work complete and functioning as a result of the substitution.

BIDDER/CONTRACTOR	DATE

REVIEW AND ACTION

☐ Resubmit substitution request with the following additional information:

☐ Substitution is accepted.

☐ Substitution is accepted with the following comments:

☐ Substitution is not accepted.

ARCHITECT/ENGINEER	DATE

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

ROOFING SYSTEM DESCRIPTION

PROJECT NUMBER

GENERAL INFORMATION

AGENCY NAME			
AGENCY CODE	FACILITY NUMBER	SITE NUMBER	
BUILDING NAME			
BUILDING ADDRESS	CITY	STATE	ZIP CODE
DATE OF ROOF COMPLETION	ROOF SLOPE	ROOF AREA	ROOF HEIGHT (AGL)
ROOF CONSULTANT	BUILDING USE		
ROOF ACCESS	ADMIN/INSPT		
WARRANTY	ROOF MANUFACTURER		
ROOF INSTALLER	GENERAL CONTRACTOR		

COMPONENT	TYPE	COMMENTS
SURFACING RIVER GRAVEL, PEA GRAVEL, COATING, PAVERS, NONE		
MEMBRANE BUILT-UP, EDPM-FA, EDPM-B, EDPM-MF, METAL-SS, METAL-AR, SHINGLE, PVC, FOAM, OTHER		
INSULATION POLYSTYRENE, ISO BOARD, FIBERGLASS, FIBERBOARD, PERLITE, URETHANE, NONE, OTHER		
THICKNESS		
ATTACHMENT		
VAPOR BARRIER KRAFT, FELT, ALUMINUM FOIL, POLY, PLASTIC, OTHER		
DECK STEEL, WOOD, GYPSUM (SLAB OR PLANK), LT. WT. CON., REG. CON., OTHER		
STRUCTURAL SYS. STEEL JOIST, WOOD TRUSSES, CONCRETE, METAL PURLINS		

DESCRIPTION OF ROOF-TOP ACCESSORIES

ROOFING SYSTEM DESCRIPTION

GENERAL INFORMATION – PROJECT NUMBER (FMDC PROJECT NUMBER)

1. Site and Facility number from LABS Database.

2. Agency Name and Code: (OA-01, AG-02, CORR-30-, ECON DEV-04, DESE-05, HEALTH-14, MHTD-07, LIR-08, MH-09, DNR-10, PS-11, REV-12, SS-13)

3. Roof Slope should be average slope over entire roof area.

4. Building Use – describe the type of occupancy such as office, food service, boiler, warehouse, swimming pool, etc.

5. Roof access – describe what is necessary to reach the roof. Is it necessary to bring a ladder? Is there a roof hatch? If so, where?

6. Admin/Inspt – FMDC Construction Administrator or other inspector used during roof installation for quality control.

7. Warranty – If there is a roof warranty, indicate length of warranty and attach a copy to this report. Secure copy of warranty at the end of new or re-roof projects.

8. Roof Manufacturer – List name of primary materials supplier, company issuing the warranty. For single-ply roofs and Modified bitumen roofs secure 8 inch by 8 inch sample of roof membrane or cap sheet from actual material used on job.

9. Roof Installer – List company name and phone number.

10. General Contractor – List company name and phone number.

11. Component, Type, Comments – Describe system used and any unusual characteristics of the system.

12. Description of Roof Top Accessories – Indicate type and size or number of vents, skylights, roof-type HVAC units, roof piping, etc.